

REMARKS

In the Office Action the Examiner has objected to the claims under 37 C.F.R. 1.75(c), as being of improper dependent form and for informalities. The Examiner has also raised certain rejections to the claims under 35 U.S.C. § 112, second paragraph and sixth paragraph, under 35 U.S.C. § 102(b), under 35 U.S.C. § 103(a) and provisionally, for double patenting. Applicant responds to each of the Examiner's rejections below.

As a preliminary matter, Applicant would like to note that the amendments to the claims were made solely for the purpose of more particularly pointing out and particularly claiming the subject matter which Applicant regards as the invention. Each of the amendments is supported by the specification.

OBJECTIONS TO THE CLAIMS:

The Examiner has objected to claims 33 and 40 under 37 C.F.R. 1.75(c) as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant has amended the claim, as interpreted by the Examiner, to depend from a previous claim. Applicant, therefore, submits that the Examiner's objection to claims 33 and 40 should be withdrawn.

The Examiner also objected to claim 35 because of a typographical error. Applicant has amended the claim to recite "a translocating chemical moiety" in line 12 of the claim. Applicant, therefore, submits that the Examiner's objection to claim 35 should be withdrawn.

REJECTION UNDER 35 U.S.C. § 112, Second Paragraph:

The Examiner has rejected claims 1-20, 31-33, 36, 38-41 and 46-48 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Applicant has amended each of claims 1-20, 31-33, 36, 38-41 and 46-48, either as suggested by the Examiner or to clarify the subject matter being claimed. Therefore, the Examiner's rejection of claims 1-20, 31-33, 36, 38-41 and 46-48 should be withdrawn.

REJECTION UNDER 35 U.S.C. § 112, Sixth Paragraph:

The Examiner has indicated that the limitation “a means for signal detection” in line 1 of claim 6 and the limitation “means to move the fluids” in line 1 of claim 20 are not being treated under 35 U.S.C. § 112, sixth paragraph because the Specification does not provide specific limitations as to the means for providing these functions.

Applicant has amended claim 6 to remove the means-plus-function language. Applicant, therefore, submits that the rejection should be withdrawn. With respect to claim 20, Applicant points to paragraphs 72, 77, 78 and 79 to show that there is reference in the Specification of the present application to structure and prior art systems that provide such disclosure of limitations as to the means. Applicant, therefore, submits that the Examiner’s rejection should be withdrawn.

REJECTION UNDER 35 U.S.C. § 102(b):

The Examiner has rejected claims 1-8, 13-14, 17-18, 20 and 30-36 under 35 U.S.C. § 102(b) as being anticipated by Wang et al. (U.S. Patent Application Publication No. US 2002/0182627 A1) (“Wang”).

Wang describes a system for measuring ion transport function in various compounds (paragraphs 19 and 73). The Wang system utilizes micromanipulation methods, including binding the cells to magnetic or dielectric responsive particles, to direct the cells (together with the particles) to areas on a biochip that have ion transport measurement or detection structures. The Wang system describes the use of microfabricated holes (0.1 to about 100 micrometers) for passing the cells through for purposes of measuring the ion transport function of the cells (paragraphs 73-82). There is no description in Wang regarding nanopore systems or technology.

Wang does not teach or suggest “an apparatus for identifying a chemical moiety from a sample solution,” “a solid state nanopore system downstream from the substrate for identifying the chemical moiety received from the channel after the chemical moiety has been released from the at least one array,” “a nanopore adjacent to the first ring electrode and the second ring electrode and positioned to allow the chemical moiety to be positioned in the first ring electrode and the second ring electrode” or “a voltage source for electrically connecting the first ring electrode to the second ring electrode for

applying a ramping potential from the first ring electrode, through a portion of the chemical moiety in the nanopore to the second ring electrode to produce a signal indicative of the portion of the chemical moiety,” as recited in claim 1. Wang also does not teach or suggest “an apparatus for identifying a chemical moiety from a sample solution,” “a solid state nanopore system downstream from the substrate for identifying the chemical moiety received from the channel after the chemical moiety has been released from the at least one array,” “a first electrode having a first nanopore,” “a second electrode, adjacent to the first electrode, having a second nanopore, wherein the first nanopore of the first electrode is positioned with the second nanopore of the second electrode so that the chemical moiety may translocate through the first nanopore and the second nanopore” or “a voltage source for electrically connecting the first electrode to the second electrode for applying a ramping potential from the first electrode, through a portion of the chemical moiety in the first nanopore and the second nanopore to the second electrode to produce a signal indicative of the portion of the chemical moiety,” as recited in claim 30. Moreover, Wang does not teach or suggest “an apparatus for identifying a chemical moiety from a sample solution,” “a solid state nanopore system downstream from the substrate for identifying the chemical moiety received from the channel after the chemical moiety has been released from the at least one array,” “a second electrode spaced from the first electrode to define a nanopore between the first electrode and the second electrode, the nanopore designed for receiving a translocating chemical moiety, the first electrode being in electrical connection with the second electrode” or “a voltage source for electrically connecting the first electrode to the second electrode for applying a ramping potential from the first electrode, through a portion of the chemical moiety in the nanopore to a second electrode to produce a signal indicative of the portion of the chemical moiety,” as recited in claim 35. Therefore, claims 1, 30 and 35 are not anticipated by Wang.

Because claims 2-8, 13-14, 17-18, 20, 31-34 and 36 depend from claims 1, 30 or 35, they also cannot be anticipated by Wang.

REJECTION UNDER 35 U.S.C. § 103(a):

The Examiner has rejected claims 1, 9, 15 and 19 under 35 U.S.C. § 103(a) as being unpatentable over Wang et al. in view of Yasuda et al. (U.S. Patent No. 6,218,126 B1) (“Yasuda”).

As stated above, Wang does not anticipate claim 1 of the present application.

Yasuda describes a method and apparatus for selectively extracting a target polynucleotide having a specific base sequence from a polynucleotide mixture sample having a plurality of different sequences or from cells.

Neither Wang nor Yasuda, alone or in any known combination, teaches or suggests “an apparatus for identifying a chemical moiety from a sample solution,” “a solid state nanopore system downstream from the substrate for identifying the chemical moiety received from the channel after the chemical moiety has been released from the at least one array,” “a nanopore adjacent to the first ring electrode and the second ring electrode and positioned to allow the chemical moiety to be positioned in the first ring electrode and the second ring electrode” or “a voltage source for electrically connecting the first ring electrode to the second ring electrode for applying a ramping potential from the first ring electrode, through a portion of the chemical moiety in the nanopore to the second ring electrode to produce a signal indicative of the portion of the chemical moiety,” as recited in claim 1. Therefore, claim 1 is not obvious over Wang in view of Yasuda.

Because claims 9, 15 and 19 depend from claim 1, they cannot be obvious over Wang or Yasuda, either alone or in any known combination.

The Examiner has rejected claims 1, 10 and 16 under 35 U.S.C. § 103(a) as being unpatentable over Wang et al. in view of Chin et al. (U.S. Patent No. 6,197,599 B1) (“Chin”).

As stated above, Wang does not anticipate claim 1 of the present application.

Chin describes an array for capturing agents on a support in a specific predetermined order so that they can be used to identify proteins captured by the array based on their position in the array.

Neither Wang nor Chin, alone or in any known combination, teaches or suggests “an apparatus for identifying a chemical moiety from a sample solution,” “a solid state nanopore system downstream from the substrate for identifying the chemical moiety

received from the channel after the chemical moiety has been released from the at least one array,” “a nanopore adjacent to the first ring electrode and the second ring electrode and positioned to allow the chemical moiety to be positioned in the first ring electrode and the second ring electrode” or “a voltage source for electrically connecting the first ring electrode to the second ring electrode for applying a ramping potential from the first ring electrode, through a portion of the chemical moiety in the nanopore to the second ring electrode to produce a signal indicative of the portion of the chemical moiety,” as recited in claim 1. Therefore, claim 1 is not obvious over Wang in view of Yasuda.

Because claims 10 and 16 depend from claim 1, they cannot be obvious over Wang or Chin, either alone or in any known combination.

The Examiner has rejected claims 1, 11 and 12 under 35 U.S.C. § 103(a) as being unpatentable over Wang et al. in view of Denong Wang (PCT International Publication No. WO 02/083918 A2) (“Denong Wang”) as evidenced by Wade (Organic Chemistry, 2nd ed., Prentice-Hall, Englewood Cliffs, NJ (1997), page 1045) (“Wade”).

As stated above, Wang does not anticipate claim 1 of the present application.

Denong Wang describes microarrays comprising nitrocellulose supports that provide three methods for detecting the presence of agents in a sample, by binding the agents to either a glycomer, an insoluble protein or an antibody or lectin, determining the amount of the agent in the sample and diagnostic methods.

Neither, Wang, Denong Wang nor Wade, alone or in any known combination, teaches or suggests “an apparatus for identifying a chemical moiety from a sample solution,” “a solid state nanopore system downstream from the substrate for identifying the chemical moiety received from the channel after the chemical moiety has been released from the at least one array,” “a nanopore adjacent to the first ring electrode and the second ring electrode and positioned to allow the chemical moiety to be positioned in the first ring electrode and the second ring electrode” or “a voltage source for electrically connecting the first ring electrode to the second ring electrode for applying a ramping potential from the first ring electrode, through a portion of the chemical moiety in the nanopore to the second ring electrode to produce a signal indicative of the portion of the chemical moiety,” as recited in claim 1. Therefore, claim 1 is not obvious over Wang in view of Denong Wang as evidenced by Wade.

Because claims 11 and 12 depend from claim 1, they cannot be obvious over Wang, Denong Wang, or Wade, either alone or in any known combination.

The Examiner has rejected claims 37-51 under 35 U.S.C. § 103(a) as being unpatentable over Wang et al. in view of Ootsubo et al. (U.S. Patent Application Publication No. US 2003/0087297 A1) ("Ootsubo").

Wang does not teach or suggest "an apparatus for identifying a chemical moiety from a sample solution," "a solid state nanopore system downstream from the substrate for identifying the chemical moiety received from the channel after the chemical moiety has been released from the at least one array," "a first electrode layer having a first portion of the nanopore extending there through and defining a first electrode edge," "a first insulator layer adjacent to the first electrode layer, the first insulator layer having a second portion of the nanopore there through and defining a first insulator edge, the first insulator edge overhanging the first electrode edge" or "a second electrode layer adjacent to the first insulator layer, the second electrode layer having a third portion of the nanopore there through and defining a second electrode edge, the second electrode edge overhanging the first insulator edge; wherein the first electrode and the second electrode may be electrically ramped for sensing the chemical moiety," as recited in claim 37.

Ootsubo describes a biochip for examining the sequence of genes of biopolymers such as DNA and proteins by implementing hybridization using a specific fluorescent enhancement part and the metal layer thereof as an electrode.

Neither Wang nor Ootsubo, alone or in any known combination, teaches or suggests "an apparatus for identifying a chemical moiety from a sample solution," "a solid state nanopore system downstream from the substrate for identifying the chemical moiety received from the channel after the chemical moiety has been released from the at least one array," "a first electrode layer having a first portion of the nanopore extending there through and defining a first electrode edge," "a first insulator layer adjacent to the first electrode layer, the first insulator layer having a second portion of the nanopore there through and defining a first insulator edge, the first insulator edge overhanging the first electrode edge" or "a second electrode layer adjacent to the first insulator layer, the second electrode layer having a third portion of the nanopore there through and defining a second electrode edge, the second electrode edge overhanging the first insulator edge;

wherein the first electrode and the second electrode may be electrically ramped for sensing the chemical moiety,” as recited in claim 37. Therefore, claim 37 is not obvious over Wang in view of Ootsubo.

Because claims 38-51 depend from claim 37, they cannot be obvious over Wang or Ootsubo, either alone or in any known combination.

PROVISIONAL DOUBLE PATENTING REJECTIONS:

The Examiner has provisionally rejected claims 1-6, 15, 30, 32-35, 37-38 on the grounds of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-8 of copending Application No. 10/352,675.

As this is a provisional rejection, should the Examiner continue to raise this rejection after the claims are otherwise in condition for allowance, Applicant will respond accordingly.

The Examiner has provisionally rejected claims 1-20 and 30-53 on the grounds of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-8 of copending Application No. 10/352,675 in view of Wang et al.

For the reasons set forth above, Wang does not teach or suggest applicants invention. Therefore, Applicant believes that the provisional double patenting rejection should be withdrawn. However, as this is a provisional rejection, should the Examiner continue to raise this rejection after the claims are otherwise in condition for allowance, Applicant will respond accordingly.

The Examiner has provisionally rejected claims 1-20 and 30-53 on the grounds of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 and 4-15 of copending Application No. 10/898,586.

As this is a provisional rejection, should the Examiner continue to raise this rejection after the claims are otherwise in condition for allowance, Applicant will respond accordingly.

CONCLUSION:

In view of the foregoing, Applicants respectfully submit that each of the Examiner's rejections has been overcome and that the claims are in condition for allowance.

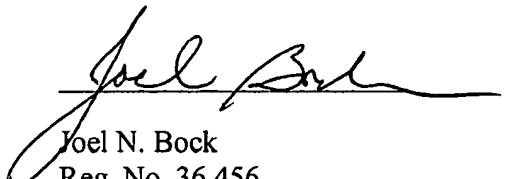
Applicants respectfully requests that the Examiner withdraw the rejection of the claims and issue a notice of allowance.

INTERVIEW:

Applicants' attorney respectfully requests that should the Examiner disagree with any of Applicants' arguments herein, the Examiner grant an interview so that the issues covered herein may be discussed with a view toward moving the application closer to allowance without the need for a final office action.

Respectfully submitted,

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